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(56) Documents Cited

GB 1273337 A GB 1255895 A

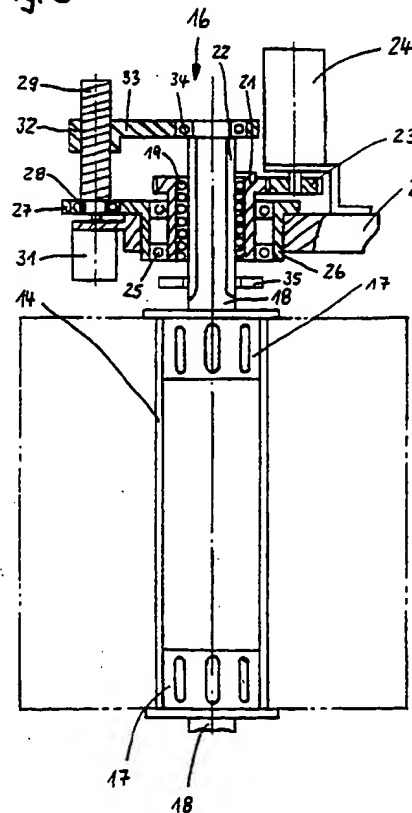
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## (54) Winding webs

(57) Each winding station of web winding apparatus includes two chucks 17 for gripping a reel core 14, the chucks being carried by respective rotatable shafts 18 which are axially oscillatable in unison so that thickened parts of a web being wound will not overlies each other in the wound mass. Each shaft is axially movable by a motor 31 acting through screw/nut 29/32. One shaft is rotated by motor 24 acting through gear 23 and sleeve 21, which is keyed at 22 to the shaft. The shafts can also be moved away from each other to release a wound reel, and towards each other to capture a new reel.

Fig. 3



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Fig. 1

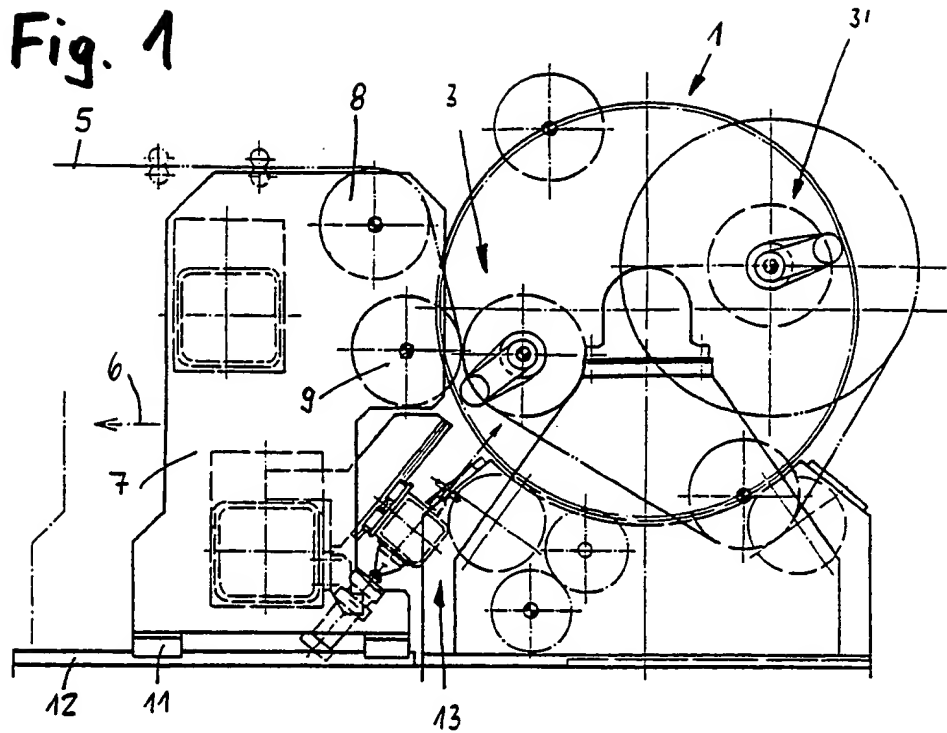


Fig. 2

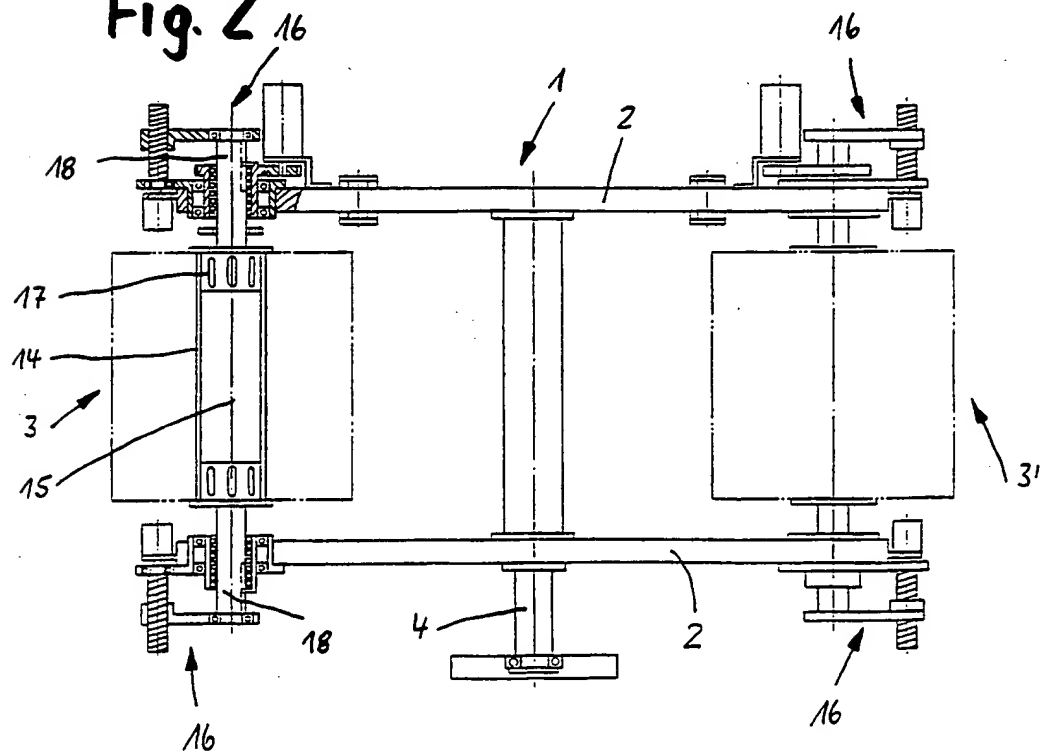
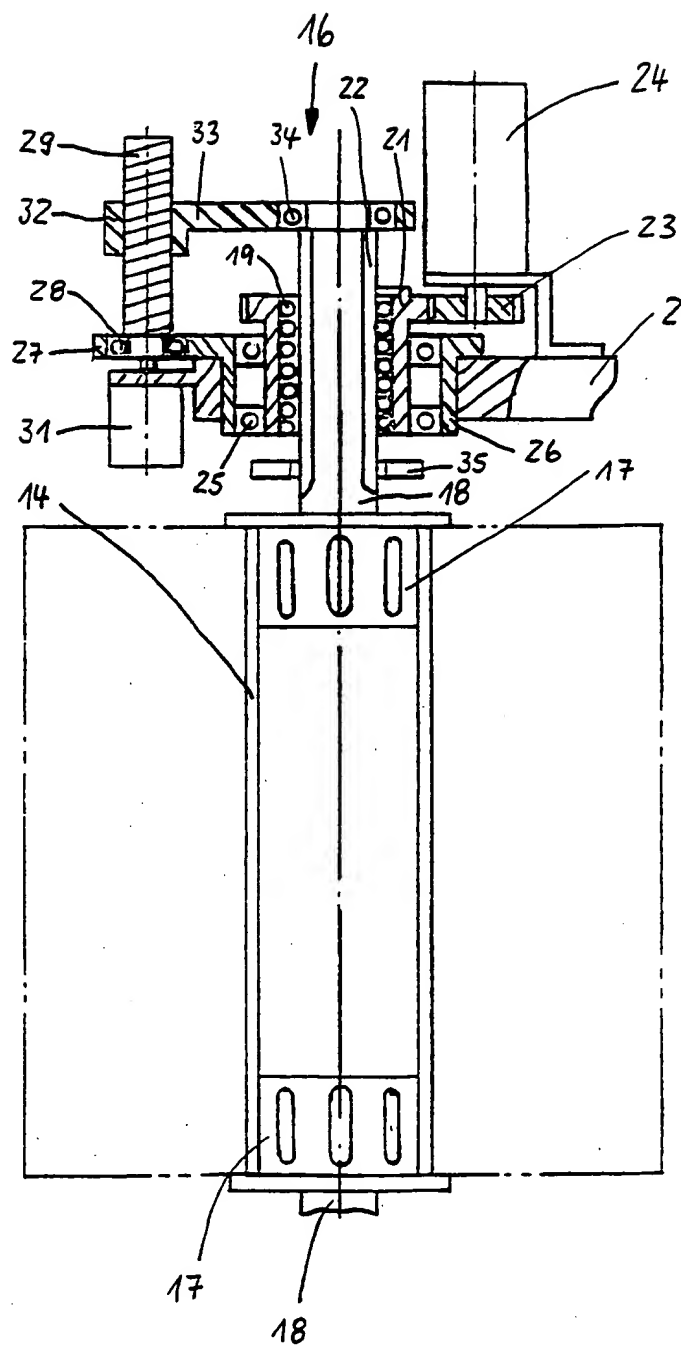


Fig. 3



TITLEWinding Webs of Material

This invention relates to a method and apparatus for winding-up webs of materials, particularly plastic foils, using a multiple reversing winding machine, with at least two winding stations situated on a rotatable mounted reel holder, each with an axially adjustable and rotatable centre sleeve with reel core clamping heads mounted on the said sleeves and serving to accommodate reel cores.

In the process of winding-up webs of material, particularly plastic foils, thickened places occurring in the web during the production of the latter will unavoidably lead to uneven laps in the wound reel. This is due to the fact that the thickened places in each layer of the winding are wound over the previous one, so that the diameter of the part of the lap affected exceeds that of the rest of the lap. This causes the web of material to lengthen as the winding proceeds, so that when it is unwound parts of it are slack. In addition, air becomes trapped between the separate layers in the remainder of the web, where no thickening has occurred and this causes the web to slip while being wound-up. Transverse slippage leads to uneven edges, while

longitudinal slippage causes the material to be compressed or squeezed, the quality of the lapping being thereby seriously lowered.

Systems are known in which, in order to prevent thickened parts of the individual layers of material from being wound onto one another, the web is wound up with a slow oscillation. For this purpose the entire machine is mounted on a comparatively heavy base frame in which an oscillating movement is set up by a suitable driving means. The oscillation is only brought to a stop in order to extract a finished wound reel. Apart from the fact that, in a system of this kind the entire machine is caused to perform an oscillatory movement through a base frame occupying a great deal of space in a pit which calls for a very bulky structure, there is also the fact that an installation so designed proves very expensive.

One of the objects of this invention is to provide a method which offers a simple means of ensuring that any thickened parts occurring in the production of a web of material, particularly of plastic foil, will be distributed over the width of the web in a largely uniform manner. Another object is to provide a multiple reversing winding machine which, by simple means, will enable an oscillating movement to occur during the winding in order to ensure the said even distribution of

thickened parts over the width of the web. A further object is to ensure that the operation of changing the finished reels will not involve suspension of the oscillatory motion accompanying the winding process at that moment.

According to this invention there is provided a method for winding-up webs of material onto a reel core in a multiple reverse winding machine with at least two winding stations mounted on a rotatable holder, each station having centre core mounting sleeves rotatably mounted and axially adjustable and each having core clamping heads to accommodate the reel cores, in which method the clamping heads are movable in an oscillatory manner in the direction of the rotation axis of the centre core sleeves during the winding of the web of material.

By this means the clamping chucks of each winding station, while the web of material is being wound-up, are controlled in an oscillatory manner together in the direction of the rotation axis of the centre sleeves. In contrast to the prior art, therefore, it is no longer necessary for an oscillatory movement to be imparted to the entire machine as it is sufficient for only one winding station to be caused to oscillate in each case. This adjustment of one winding station makes it possible

for the second winding station to be centred, for example, for the operation of changing the finished wound reels.

The clamping chucks of the one winding station concerned are advantageously designed to be oscillatorily adjustable independently of those of the other.

A practical construction for a winding machine for winding webs of material, particularly plastic foil, with at least two winding stations situated on a rotatably mounted winding station holder, each with an axially adjustable centre core sleeve drive in rotation and with clamping heads mounted on the said sleeves and serving to accommodate reel cores, comprises and according to this invention provides that the centre core sleeves associated with each winding station, independently of their adjustment movement, for clamping and releasing the clamping heads during the winding of the web, are to be designed to be oscillatorily adjustable together by means of an adjusting drive, in the direction of the rotation axis of the centre core sleeves. It has been found of particular advantage for one and the same adjusting drive to be used for clamping and releasing the centre core sleeves and for effecting the oscillating movement of the winding station. This provides a particularly simple and economical solution.

In one advantageous embodiment of the invention the adjusting drive may consist of a linear drive designed, for example, as an electromechanical linear actuator provided on both sides of each winding station with an electric motor having an output shaft constructed as a threaded spindle as well as a threaded nut connected via a bearing with the respective associated centre core sleeve.

A preferred embodiment of this invention is described and illustrated with reference to the drawing and explained in more detail hereinafter. In the drawings:-

Figure 1 shows a schematic diagram of a multiple station reversing winding machine,

Figure 2 shows the corresponding top plan view of the machine of Figure 1 to a larger scale and partly in section, and

Figure 3 shows a detail of a winding station with an adjustable drive system.

As shown in Figures 1 and 2, the multiple station reversing winding machine shown therein has a winding station holder 1 having two winding station positions 3, 3', mounted on two spaced rotary discs 2 of the said holder 1. The rotary discs 2 are situated a certain distance apart and interconnected via a shaft 4 which can



be driven by a driving means, not shown in detail, in such a way that the winding stations 3, 3', offset in relation to each other by an angle of 180°, can be brought to one winding position or the other.

For feeding the web of material 5, such as a plastic foil, from a preceding production machine, not shown, a guide roller 8 and a contact roller 9 are provided on a carriage 7 adjustable in the direction shown by the arrow 6 to be movable in the direction of the said arrow 6 together with the carriages 7 by guides 11 on a guide rail 12 as the diameter of the wound reel increases. A finished reel is extracted from the winding station 3' as soon as the web of material 5 has been cut by means of a cross cutting device 13. The new starting point of the web of material and the withdrawal of a finished reel in the case of multiple reversing winding machines form an operation already known per se and does not form part of the present invention.

In the production of webs of material 5, particularly plastic foils, factors connected with the technique of production make it unavoidable for slightly thickened parts to occur in the material, these being continuously found in the same place as a result of the way in which a web of this kind is produced. The result is that these thickened parts always overlap one above

the other as the web of material is wound-up, the reel thus becoming thicker in this position than elsewhere. To ensure a statistically even distribution of these thickened parts, the particular winding station which is effective at the time in the winding machine is adjusted in an oscillatory manner in the direction along the rotation axis 15 of the reel core 14. For this purpose an adjusting drive 16 is provided which at the same time serves to move core clamping heads or chucks 17 into the reel core 14 while the reel is being wound-up or to extract a finished reel from the core. The clamping heads 17 constitute or are borne on centre sleeves 18 (Figure 3) which are mounted in a driving sleeve 21, in an axially movable manner, via an axial guide constructed as a ball guide 19 but which is connected with the said driving sleeve by an interlock using a keyed groove 22. The driving sleeve 21 in turn is operatively connected via a driving pinion 23 with a driving motor 24 mounted on the rotary disc 2. The driving sleeve 21 is supported by bearings 25 in a bearing housing 26 which itself is likewise positioned in the rotary disc 2. The bearing housing 26 has a flange 27 in which an output shaft of an electric motor 31 is mounted by a bearing 28, the said shaft taking the form of a threaded spindle 29 and the motor itself being likewise mounted on the rotary

disc 2. The threaded spindle 29 interacts with a threaded nut 32 which in turn is connected to the centre core sleeve 18 (shaft of the core clamping head) via a connecting piece 33 and a bearing 34. Between the driving sleeve 21 and the clamping head 17 of the centre core sleeve 18 a limiting stop 35 is provided which acts in the direction of the outward stroke of the clamping head. This stop constitutes a mechanical means of ensuring that if a fault occurs the clamping head 17 cannot get out of control and disengage from the core 14 or from the reel.

By the use of the adjusting drive 16 and by operating the electric motors 31 the centre sleeves 18 are moved inwards together in order to take up a fresh reel core 14, while operation of both in the reverse direction causes the centre sleeves to move outwards so that a finished reel can be extracted from the winding position.

This adjusting drive 16 at the same time serves to cause each of the winding stations 3, 3', in alternation to perform an oscillating movement. For this purpose the electric motors 31 are actuated by a control system, not shown in the drawing, in such a way that via the threaded spindles 29 and the threaded nuts 32 interacting with them and via the connecting pieces 33 an axial

adjusting movement in the same direction or sense is exerted on the two centre sleeves 18 of the winding station in use. This results in the desired oscillating movement by which a statistically uniform distribution of the thickened parts present in the web of material is obtained.

CLAIMS

1. Method for winding-up webs of material onto a reel core in a multiple reverse winding machine with at least two winding stations mounted on a rotatable holder, each station having centre core mounting sleeves rotatably mounted and axially adjustable and each having core clamping heads to accommodate the reel cores, in which method the clamping heads are movable in an oscillatory manner in the direction of the rotation axis of the centre core sleeves during the winding of the web of material.
2. Method in accordance with Claim 1, wherein the clamping heads of one winding station are movable in an oscillatory manner independently of the clamping heads of the other winding station.
3. Winding machine for winding-up webs of material with two winding stations situated on a rotatably mounted winding station holder, each station having centre core sleeves rotatably mounted and axially adjustable and with clamping heads or chucks to accommodate reel cores wherein the centre core sleeves associated with each winding station and independently of adjustment for

clamping and releasing the reel core by means of the clamping heads during the winding of the web, are arranged to be movable in an oscillatory manner together during winding of a web by means of a drive, the movement being in the direction of the rotation axis of the centre core sleeves.

4. Winding machine in accordance with Claim 3, wherein the same drive is used for clamping and releasing the centre core sleeves and the core clamping heads and to produce the oscillating movement of the winding station.

5. Winding machine in accordance with Claims 3 or 4, wherein the drive is formed by a linear drive.

6. Winding machine in accordance with Claim 5, wherein the linear drive comprises an electromechanical linear actuator provided on both sides of each winding station with an electric motor having an output shaft comprising a threaded spindle with a threaded nut thereon connected through a bearer with a respective associated centre core sleeve.

7. Winding machine in accordance with Claim 6, wherein the electric motor is mounted on the winding station

holder which is constructed as a rotary disc or like support, the threaded spindle being rotatably mounted by a bearing in a flange of a supporting element.

8. Winding machine in accordance with Claim 7, wherein the bearer is secured to the rotary disc and through bearings forms a support for a driving sleeve which is connected fast in rotation with the relevant centre core sleeve and which can be driven in rotation by a driving motor mounted on the rotary disc.

9. Winding machine in accordance with Claim 8, wherein the centre core sleeve is guided in the associated driving sleeve by means of an axial guide means preferably taking the form of a ball guide.

10. Winding machine in accordance with Claim 8, wherein the centre core sleeve is guided in the associated driving sleeve by means of an axial guide constructed as a guide bushing.

11. Winding machine in accordance with any one of Claims 8 to 10, wherein a limit stop is provided between the clamping head and the driving sleeve and which acts in the direction of the outward release stroke of the

clamping head to prevent excess travel of the core sleeve.

12. Method for winding-up webs of material carried out substantially as described herein and exemplified with reference to the drawings.

13. A winding machine constructed and arranged to function as described herein and as exemplified by the drawings.



**Relevant Technical Fields**

- (i) UK Cl (Ed.N) B8R (RRR1, RRR4, RRR5, RRR6, RRW1)  
(ii) Int Cl (Ed.6) B65H 18/00, 18/02, 18/04, 18/10

Search Examiner  
E W BANNISTER

Date of completion of Search  
17 MAY 1995

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE: WPI

Documents considered relevant following a search in respect of Claims :-  
1-13

**Categories of documents**

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| Category | Identity of document and relevant passages   | Relevant to claim(s) |
|----------|--|----------------------|
| X        | GB 1273337 A (SULZER) whole document         | 1 and 3              |
| X        | GB 1255895 A (DU PONT) eg lines 42-56 page 3 | 1 and 3              |

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